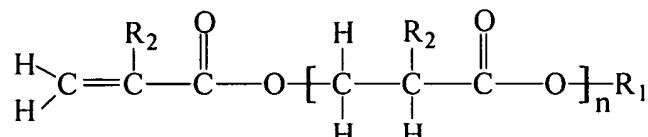


Claims

1. A process for cleaving a (meth)acrylic acid oligomer of structure I

5



I

wherein

R₁ is a hydrogen atom or a C₁ to C₁₀ alkyl groups

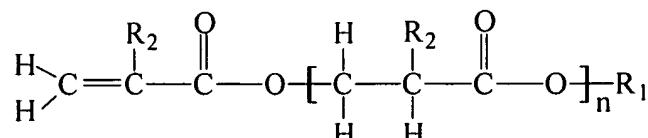
10 R₂ is a hydrogen atom or a methyl group, and

n is a whole number within the range between 1 and 200,

wherein the (meth)acrylic acid oligomers are heated to a temperature of at least 50°C at a pressure of at least 1 bar.

15

2. Process for cleaving a (meth)acrylic acid oligomer of structure I



I

wherein

20 R₁ is a hydrogen atom or a C₁ to C₁₀ alkyl groups

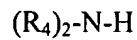
R₂ is a hydrogen atom or a methyl group, and

n is a whole number within the range between 1 and 200,

with a cleaving agent of structure II



5 or of structure III



wherein

10

R_3 is a hydrogen atom, a C_1 to C_{12} alkyl group, or a $-C_xH_{2x}-OH$ group, wherein x is a whole number within a range from 1 to 12, and

15

R_4 is a hydrogen atom or a C_1 to C_{12} alkyl group, with the proviso that not both R_4 groups are hydrogen atoms,

wherein the (meth)acrylic acid oligomer is brought into contact with the cleaving agent at a temperature of at least 50 °C and at a pressure of at least 1 bar.

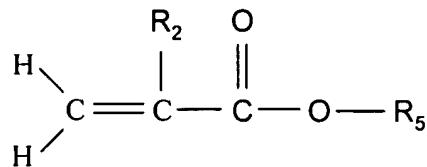
20

3. Process according to claim 2, wherein the cleaving agent and the (meth)acrylic acid oligomer are used in a weight ratio cleaving agent : (meth)acrylic acid oligomer within a range from 0.01 : 1 to 10 : 1.

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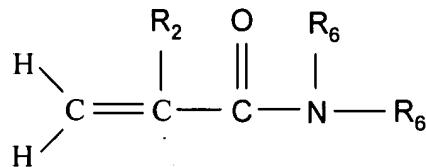
4. Process according to one of claims 2 or 3, wherein the cleaving agent is water, ethanol, n-butanol, or a mixture of at least two of these compounds.

5. Process according to any one of the preceding claims, wherein by means of the cleaving a compound of structure IV



5

or of structure V



10 is separated,

wherein .

R₆ is an H atom or a C₁ - C₁₂ alkyl group, with the proviso that not both R₆ groups are hydrogen atoms,

15 R₅ is an H atom, a C₁ - C₁₂ alkyl group or a -C_xH_{2x}-OH- group, whereby x is a whole number within a range from 1 to 12, and

R₂ is an H atom or a methyl group.

6. Process according to any one of the preceding claims, wherein the (meth)acrylic acid oligomers are used in the form of a composition, which is obtained as bottom 20 product of the distillative work-up of the (meth)acrylic acid solution in process step iii) during the process for (meth)acrylic acid synthesis comprising the process steps

i) catalytic oxidation of C₃ or C₄ starting compounds in the gas phase,

- ii) absorption or condensation or both of the formed (meth)acrylic acid in water, and
- iii) work-up of the thus-obtained aqueous (meth)acrylic acid solution by distillation.

5

7. Process according to any one of the preceding claims, wherein the (meth)acrylic acid oligomers are used in the form of a composition which is obtained as mother liquor during the purification by crystallization in process step IV) during the process for (meth)acrylic acid synthesis comprising the process steps

- I) catalytic oxidation of C₃ or C₄ starting compounds in the gas phase,
- II) absorption or condensation or both of the formed (meth)acrylic acid in water to form an absorption product,
- III) optionally, work-up of the thus-obtained aqueous (meth)acrylic acid solution by distillation, and
- IV) purification by crystallization of the absorption product or of the concentrated (meth)acrylic acid solution obtained by distillation or of both.

8. Process according to any one of claims 2 to 7, wherein the (meth)acrylic acid oligomer is brought into contact with the cleaving agent at a temperature of at least 250 °C and at a pressure of at least 10 bar.

9. Process according to any one of the preceding claims, wherein the cleaving occurs in the presence of a catalyst.

25 10. Use of compounds of structure II or of structure III, as defined in claim 1, as cleaving agent for cleaving (meth)acrylic acid oligomers of structure I at a temperature of at least 50 °C and at a pressure of at least 1 bar.

11. Device for production of (meth)acrylic acid comprising as components connected with each other in fluid-communicating fashion a (meth)acrylic acid synthesis unit, a quench absorber, a distillation device and/or a crystallization device, as well as a (meth)acrylic acid oligomer cleaving device, wherein the (meth)acrylic acid oligomer cleaving device comprises a cleaving agent reservoir, at least one first and one second conveyor unit, a mixing device, a heating device, a cleaving reactor and at least a first to fifth conduit, wherein

5 (β1) the first conveyor unit comprises a feed line, which communicates a composition comprising a (meth)acrylic acid oligomer as defined in claim 1;

10 (β2) the cleaving agent reservoir is connected to the second conveyor unit by a first conduit;

15 (β3) the first and the second conveyor unit are connected to the mixing device by a second and third conduit;

(β4) the mixing device is connected to the heating device by a fourth conduit;

(β5) the heating device is connected to the cleaving reactor by a fifth conduit.

20

12. Device according to claim 11, wherein the composition which is communicated in the feed line to the first conveyor unit corresponds to the composition defined in claim 6.

25

13. Device according to claim 11, wherein the composition which is communicated in the feed line to the first conveyor unit corresponds to the composition defined in claim 6 or 7.

14. Use of a device according to any one of claims 11 to 13 for production of (meth)acrylic acid.

15. Use of (meth)acrylic acid obtainable by the use of a device according to any one of claims 11 to 13 for production of fibers, formed articles, films, foams, leather additive, paper additives, detergents, as well as superabsorbing polymers or hygiene articles.

5

List of reference numerals

5

- 1 reactant tank
- 2 reactant line
- 3 reactant valve
- 4 reactant pressure pump
- 10 5 mixing device
- 6 cleaving agent reservoir
- 7 cleaving agent line
- 8 cleaving agent valve
- 9 cleaving agent pressure pump
- 15 10 heating device
- 11 heat exchanger
- 12 pressure release valve
- 13 condenser, optionally distillation device
- 14 protective gas feed line
- 20 15 cooling agent feed line
- 16 cooling agent discharge
- 17 condenser head
- 18 pure product line
- 19 crystallization device
- 25 20 high boiler tank

- 21 high boiler recycling
- 22 high boiler disposal
- 23 flash device
- 24 discharge for the liquid phase P1
- 5 25 further discharge for the gaseous phase P2